of-band emissions for equipment of this type compared to small, low-cost mobile terminals which might have much more difficult size, weight and cost constraints.

TRW also points out that WCAI's suggestion that MSS may avoid interference from ITFS/MDS by either not operating in the vicinity of the ITFS/MDS transmitters, or by not using the higher frequency portion of the 2483.5-2500 MHz band is not an appropriate way to solve this potential interference problem. The primary way to solve adjacent channel interference situations of this type is to control out-of-band emissions of the interfering system. To impose any additional operational burdens on the victim system, especially when that system is a roaming mobile system, would be totally unacceptable.

WCAI's suggestion that the Commission can promote MSS without utilizing the 2483.5-2500 MHz band would amount to giving Motorola a monopoly in the field and would be totally contradictory to the world-wide MSS frequency allocations made during WARC'92.

WCAI's comments concerning the use of digital modulation indicates that these systems are at an early stage of development, but that it is likely that most ITFS stations will eventually convert to digital technology. This provides an excellent opportunity for any additional out-of-band emission suppression requirements to be incorporated into this new generation digital equipment. The Commission should ensure that the ITFS/MDS community is notified in time of this potential requirement so that the opportunity for efficient compliance with the new requirements is not lost.

In NTCA's Comments reference is made to the Commission's policy towards incumbent microwave systems when emerging technology service providers cause them to be relocated. In this case, the emerging technology service provider must pay the costs of relocation. This is not the case in the current proceedings. MSS is in an adjacent band to that used by ITFS/MDS, and no relocation is required. All that might be required is a tightening up of the out-of-band emissions of the ITFS/MDS service. In this case there is no requirement for the MSS service to pay the costs of any modifications to the ITFS/MDS equipment in order to comply with a reasonable out-of-band emission requirement.

8. Intersystem Coordination

TRW does not agree with Ellipsat which proposes that PFD limit values be determined at this stage. The ultimate values of PFD used will be determined from a joint consideration of intra-service coordination (i.e., between CDMA MSS systems) and inter-service sharing (i.e., between MSS systems and the FS). The latter constraint needs to be fully understood before PFD values are fixed, and this matter is currently under study within ITU-R TG2/2. It would be premature to make an arbitrary allocation of PFD between the systems until such time as the FS interference issue is fully understood.

Coordination among the CDMA applicants/licensees cannot usefully start until some time after the FCC rulemaking is completed, because the available spectrum and hence the channel/spreading bandwidths cannot be determined until then. Clearly, because of LQP's narrow CDMA channel bandwidth (1.25 MHz), this is not such an issue, but for systems with wider channel bandwidths (ODYSSEY, Constellation and Ellipsat), the channel bandwidth will remain an issue until the rulemaking is completed. After the rulemaking, some time will be required to allow the applicants to make any system design changes which are necessary as a result of the rulemaking decisions. Only when the systems have been optimized at this stage can the CDMA coordinations be usefully conducted. It is also conceivable that further system design changes might result from the CDMA coordinations. For this reason the optimum time to start the CDMA coordinations is after the rulemaking and before the filing with the Commission of the final system amendments. Coordinations should not plan to be completed until after the system designs are frozen, following the filing of the system amendments.

Attachment 1

Interference Effects on CDMA Operating in the 2.4835 to 2.500 GHz Band in the Los Angeles Area

TRW performed analyses of interference impacts upon CDMA communication systems operating in the 2483.5 to 2500.0 MHz frequency band in various urban and suburban regions within the Los Angeles area. The method of assessment was extensive field testing to determine the actual interference environmental impacts to operation of the communication system. This was preferable to attempting to simulate the known (and unknown) effects that may occur. Thus all interference sources, including ISM and ITFS, could be observed without preconceived models being employed.

The technique used in these tests was to measure the actual effect of observed interference on the operating BER of a CDMA signal. The test apparatus was placed in a vehicle with an ODYSSEY quadrifilar helix mounted on the roof. A diagram of the test configuration for the initial tests is shown in Figure 1. A programmable chip set was used to generate a BPSK spread spectrum signal. The chip set was chosen for its ability to vary the spread spectrum parameters rather than its correspondence to any particular applicant's waveform design. This allows for variation and flexibility in subsequent field testing. The setup was designed to measure BER effects in the absence of error correction encoding (and its attendant bit interleaving) or voice encoding. The "raw" effects will then be used to assist in the optimum design of both error and voice encoding schemes. Additionally, this setup was chosen for the initial round of testing so that the effects of interference could be isolated from other expected phenomena such as multiple access noise and fading effects. Models for both of these effects are well known and can be used in conjunction with simulation to assess their impact on CDMA operation. Once all the effects are incorporated into a specific design for the CDMA signal, the interference tests will be rerun to verify the chosen implementation.

Interference effects were measured in several regions of the Los Angeles area. Districts included business, commercial, light and heavy industry, residential, as well as

near hospitals and schools. These districts were located in downtown, inner city, suburban, and outskirt areas. Additional measurements were made in the vicinity of the Los Angeles airport. Measurements were made while the vehicle was in motion on major thoroughfares, highways, and lesser traveled streets. Tests were conducted both while the vehicle was in motion and at rest. The test data covered time range of 10:00 to 21:00 local time.

Test results showed that most areas were free of interference sufficiently strong to result in high BER. Occasional bit errors were observed. However, the bit errors were of an extremely transient nature and would be compensated by error correction encoding with interleaving. There would be negligible impact on digitally encoded voice signals. The only area where significant increase in BER was observed was in the high-rise "urban canyon" areas in downtown Los Angeles. More thorough testing will be done to expand the data relative to this area for use in error correction and voice encoding design. Signal strengths for terrestrial cellular coverage were examined at the time of the original test and found to be adequate for operation in the frequency bands used by terrestrial cellular. Since ODYSSEY handsets will be dual mode operable by design, they will most likely be operating through the terrestrial cellular network in this urban region and thus there would, in any case, be no effective impairment of communication service. Additional testing showed no BER impact from street lights or airport electronic emissions.

In summary, field measurements have shown that the 2483.5 to 2500 MHz band is sufficiently immune from inband interference due to ISM to cause no deleterious effect to the BER of an operating spread spectrum communication signal. This information, coupled with the measurements reported by LQP in Attachment 4 of their "Comments", demonstrate that the 2483.5 to 2500 MHz frequency band is completely adequate for use by the CDMA applicants.

Interference Field Test Setup

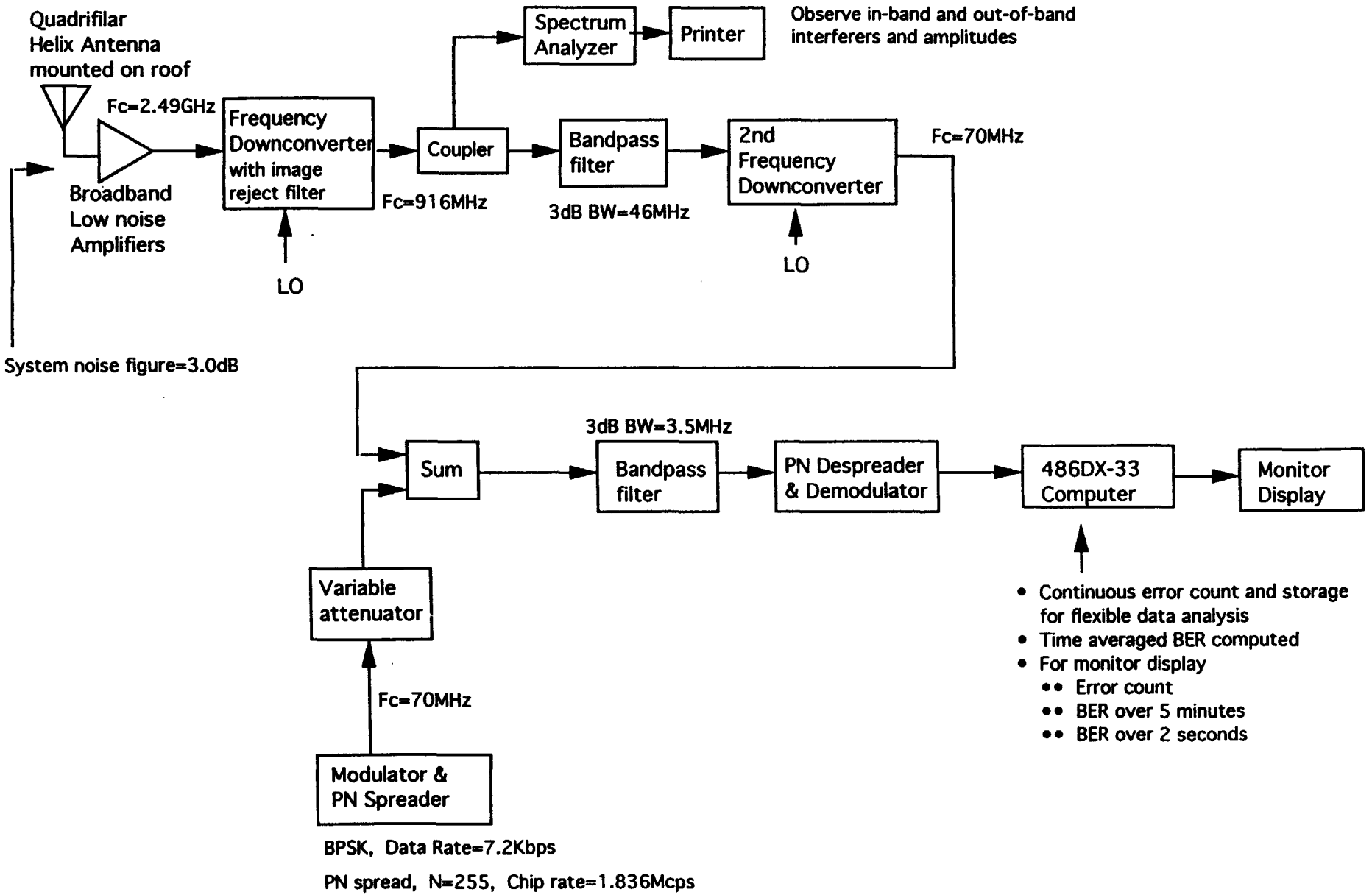

Figure 1 - Interference Field Test Setup

TECHNICAL CERTIFICATE

I, Richard J. Barnett, hereby certify that I am a technically qualified consulting engineer. I have reviewed the foregoing "Reply Comments of TRW Inc." and prepared the foregoing Technical Appendix, and certify, under penalty of perjury, that the technical information presented therein is complete and accurate to the best of my knowledge and belief.

Dated this 20th day of June, 1994

By: 

Richard J. Barnett

ATTACHMENT B

TRW'S SUGGESTED CHANGES
TO THE COMMISSION'S PROPOSED RULES
IN CC DOCKET NO. 92-166

§ 25.114 APPLICATIONS FOR SPACE STATION AUTHORIZATIONS.

(c) * * *

(6)(i) For geostationary satellite orbit satellites, orbital location, or locations if alternatives are proposed, requested for the satellite, the factors which support such an orbital assignment, the range of orbital locations from which adequate service can be provided and the basis for determining that range of orbital locations, and a detailed explanation of all factors that would limit the orbital arc over which the satellite could adequately serve its expected users.

(ii) For non-geostationary satellite orbit satellites, the number of space stations and applicable information relating to the number of orbital planes, the inclination of the orbital plane(s), the orbital period, the apogee, the perigee, the argument(s) of perigee, active service arc(s), and right ascension of the ascending node(s).

* * *

(18) Detailed information demonstrating the financial qualifications of the applicant to construct and launch the proposed satellites. Applications for domestic fixed-satellite systems and mobile-satellite systems shall provide the financial information required by § 25.140(b)-(e), § 25.142(a)(4), or § 25.143(b)(3), as appropriate. Applications for international satellite systems authorized pursuant to Establishing of Satellite Systems Providing International Communications, 50 FR 42266 (October 18, 1985), 101 FCC 2d 1046 (1985), recon. 61 RR 2d 649 (1986), further recon. 1 FCC Rcd 439 (1986), shall provide the information required by that decision.

* * *

(26) Applications for authorizations in the mobile-satellite Service in the 1545-1559/1646.5-1660.5 MHz frequency bands shall also provide all information necessary to comply with the policies and procedures set forth in Rules and Policies Pertaining to the Use of Radio Frequencies in a Land Mobile Satellite Service, 52 FR 4017 (Feb. 9, 1987), 2 FCC Rcd 485 (1987).

* * *

(28) Applications for authorizations in the 1.6/2.4 GHz Mobile-Satellite Service shall also provide all information specified in § 25.143.

(d) Applicants requesting authority to construct and/or launch a system comprised of technically identical, non-geostationary satellite orbit mobile-satellite service space stations may file a single "blanket" application containing the information specified in paragraph (c) of this section for each representative space station.

§ 25.115 APPLICATIONS FOR EARTH STATION AUTHORIZATIONS.

(d) User transceivers in the NVNG and 1.6/2.4 GHz Mobile-Satellite Service need not be individually licensed. Service vendors may file blanket applications for transceiver units using FCC Form 493 and specifying the number of units to be covered by the blanket license. Each application for a blanket license under this section shall include the following:

(1) A general narrative section describing the applicant and the overall system operation,
(2) A Form 430 (Licensee Qualification Report), if not already on file in conjunction with other facilities licensed under this subpart,
(3) A Form 493 for each fixed-gateway, TT&C or Network Control Center station operating with the network,
(4) A Form 493 for each representative type of user transceiver terminal unit,
(5) A designation of a point of contact where records of individual users will be maintained.

In addition, applicants in the NVNG MSS service shall provide the information described in § 25.135. Applicants in the 1.6/2.4 GHz Mobile-Satellite Service shall demonstrate that the stations comply with the technical requirements specified in § 25.213.

§ 25.120 LICENSE TERM AND RENEWALS.

(d) Space Stations.

(1) For geostationary satellite orbit satellites, the license term will begin at 3 a.m. EST on the date the licensee certifies to the Commission that the satellite has been successfully placed into orbit and that the operations of the satellite fully conform to the terms and conditions of the space station radio authorization.

(2) For non-geostationary satellite orbit satellites, the license term will begin at 3 a.m. EST on the date ~~that the licensee certifies to the Commission that its initial space station has been successfully placed into orbit and that the operations of that satellite fully conform to the terms and conditions of the space station system authorization~~ **six months after the launch of the system's first spacecraft, or upon the date of the licensee's filing of a certification that it has commenced service transmissions, whichever comes first. Following the occurrence of either triggering event, the Commission shall issue a public notice announcing the date upon which the system licensee's term officially commenced**. All space stations launched and brought into service during the ten-year license term shall operate pursuant to the system authorization, and **conform fully to** the **terms and conditions thereof. The** operating authority for all space stations will terminate upon the expiration of the system license.

(e) Renewal of licenses.

(1) Renewal applications. Applications for renewals of earth station ~~license~~ **licenses** must be submitted on FCC Form 405 (Application for Renewal of Radio Station License in Specified Services) no earlier than 90 days, and no later than 30 days, before the expiration date of the license. Applications for space station system replacement authorization for non-geostationary orbit satellites shall be filed no earlier than 90 days, and no later than 30 days, prior to the end of the seventh year of the existing license term.

(2) Renewal expectancy. A 1.6/2.4 GHz mobile-satellite system renewal applicant shall be entitled to license renewal if its past record for the relevant license period demonstrates that the renewal applicant:

(i) Has substantially used its spectrum for its intended purpose;

(ii) Has substantially complied with applicable Commission rules, policies, and the Communications Act; and

(iii) Has not otherwise engaged in substantial relevant misconduct.

§ 25.130 FILING REQUIREMENTS FOR TRANSMITTING EARTH STATIONS.

(b) A frequency coordination analysis in accordance with § 25.203 shall be provided for earth stations transmitting in the frequency bands shared with equal rights between terrestrial and space services, except that applications for user transceiver units associated with the NVNG mobile-satellite service shall instead provide the information required by § 25.135 and applications for user transceiver units associated with the 1.6/2.4 GHz Mobile-Satellite Service shall demonstrate that user transceiver operations comply with the requirements set forth in § 25.213.

§ 25.133 PERIOD OF CONSTRUCTION; CERTIFICATION OF COMMENCEMENT OF OPERATION.

(b) Each license for a transmitting earth station included in this part shall also specify as a condition therein that upon the completion of construction, each licensee must file with the Commission a certification containing the following information: The name of the licensee; file number of the application; call sign of the antenna; date of the license; a certification that the facility as authorized has been completed and that each antenna facility has been tested and is within 2 dB of the pattern specified in § 25.209; the date on which the station became operational; and a statement that the station will remain operational during the license period unless the license is submitted for cancellation. For stations authorized under § 25.115(c) of this part (Large Networks of Small Antennas operating in the 12/14 GHz bands) and § 25.115(d) of this part (User Transceivers in the Mobile-Satellite Service), a certificate must be filed when the network is put into operation.

§ 25.136 OPERATING PROVISIONS FOR EARTH STATION NETWORKS IN THE 1.6/2.4 GHz MOBILE-SATELLITE SERVICE.

In addition to the technical requirements specified in § 25.213, earth stations operating in the 1.6/2.4 GHz Mobile-Satellite Service are subject to the following operating conditions:

(a) User transceiver units associated with the 1.6/2.4 GHz mobile-satellite service may not be operated on civil aircraft unless the ~~earth station~~ **transceiver unit** has a direct physical connection to the aircraft Cabin Communication system.

(b) User transceiver units in this service are authorized to communicate with and through U.S. authorized space stations only. No person shall transmit to a space station unless the specific

transmission is first authorized by the space station licensee or by a service vendor authorized by that licensee.

(c) Any user transceiver unit associated with this service will be deemed, when communicating with a particular 1.6/2.4 GHz Mobile-Satellite service system pursuant to paragraph (b) of this section, to be temporarily associated with and licensed to the system operator or service vendor holding the blanket earth station license awarded pursuant to Section 25.115(d). The domestic earth station licensee shall, for this temporary period, assume the same licensee responsibility for the user transceiver as if the user transceiver were regularly licensed to it.

§ 25.141 LICENSING PROVISIONS FOR THE RADIODETERMINATION SATELLITE SERVICE.

(a) Space station application requirements. Each application for a space station license in the radiodetermination satellite service shall describe in detail the proposed radiodetermination satellite system, setting forth all pertinent technical and operational aspects of the system, including its capability for providing and controlling radiodetermination service on a geographic basis, and the technical, legal and financial qualifications of the applicant. In particular, each application shall include the information specified in ~~appendix~~ **Appendix** B of Space Station Application Filing Procedures, 93 FCC 2d 1260, 1265 (1983), except that in lieu of demonstrating compliance with item II.F (two degree spacing), applicants are required to demonstrate compatibility with licensed satellite systems in the same frequency band. Applicants must also file information demonstrating compliance with all requirements of this section, specifically including information demonstrating how the applicant has complied or plans to comply with the requirements of paragraph (f) of this section.

* * *

(f) Radiodetermination satellite service. ~~Licensee~~ **Licensees** shall coordinate with radiodetermination satellite system licensees to avoid harmful interference to other radiodetermination satellite systems through (1) power flux density limits; (2) use of pseudorandom-noise codes (for both the satellite-to-user link and for the user-to-satellite link); and (3) random access, time division multiplex techniques. ~~Licensee~~ **Licensees** shall coordinate with 1.6/2.4 GHz Mobile-Satellite Service system licensees to avoid harmful interference to 1.6/2.4 GHz Mobile-Satellite Service systems.

§ 25.143 LICENSING PROVISIONS FOR THE 1.6/2.4 GHz MOBILE-SATELLITE SERVICE.

(a) System License: Applicants authorized to construct and launch a system of technically identical non-geostationary satellite orbit satellites will be awarded a single "blanket" license covering a specified number of space stations.

(b) Qualification Requirements.

(1) General Requirements. Each application for a space station system authorization in the 1.6/2.4 GHz mobile-satellite service shall describe in detail the proposed satellite system, setting forth all pertinent technical and operational aspects of the system, and the technical, legal, and financial qualifications of the applicant. In particular, each application shall include the information specified in § 25.114.

(2) Technical Qualifications: In addition to providing the information specified in (b)(1), each applicant shall demonstrate the following:

(i) that the proposed system employs a non-geostationary constellation or constellations of satellites;

(ii) that the proposed system is capable of providing ~~mobile satellite services~~ **coverage for at least 18 hours per day** to all areas of the world, with the exception of the polar regions~~, at least 75% of every 24 hour period, i.e., that~~ **above X°,*/ with** at least one satellite ~~will be~~ visible above the horizon at an elevation angle of at least 5° ~~for at least 18 hours each day~~;

(iii) that the proposed system is capable of providing ~~voice service on a continuous basis throughout the U.S., i.e., that~~ **continuous coverage to the United States (the continental United States plus the states of Alaska and Hawaii) with** at least one satellite ~~will be~~ visible above the horizon at an elevation angle of at least 5° ~~at any point within the United States at all times~~;

---

*/ **Although TRW believes that this requirement should be relaxed modestly to require coverage of less territory, through a broader definition of "polar regions," it does not endorse a particular standard.**

(iv) that operations will not cause unacceptable interference to other authorized users of the spectrum. In particular, each application shall demonstrate that the proposed space station(s) comply with the requirements specified in § 25.213.

(3) Financial Qualifications: Each applicant for a space station system authorization in the 1.6/2.4 GHz mobile-satellite service must demonstrate, on the basis of the documentation contained in its application, that it is financially qualified to meet the estimated costs of the construction and launch of ~~all proposed space stations in the~~ that part of the proposed system that is necessary to commence commercial operations over the continental United States, and to meet the estimated operating expenses of the space stations and tracking, telemetry and control therefor for one year after the launch of the initial space station. Financial qualifications must be demonstrated in the form specified in §§ 25.140(c) and (d). Failure to make such a showing will result in the dismissal of the application.

(c) Global Applicability Of License Terms.

(1) Each authorization for a space station system in the 1.6/2.4 GHz mobile-satellite service shall specify that the terms and conditions of the subject authorization, including specifically the frequency assignment(s) thereunder, shall apply to the operation of all non-geostationary orbit satellites covered by the license issued under (a) at all times, wherever those satellites may be in their orbits around the Earth.

(2) No licensee of a space station system in the 1.6/2.4 GHz mobile-satellite service shall operate any satellite that causes harmful interference to the space stations of any other operator authorized under (a).

~~(c)~~ (d) Replacement of Space Stations Within the System License Term. Licensees of non-geostationary 1.6/2.4 GHz Mobile-Satellite Systems authorized through a blanket license pursuant to paragraph (a) of this section need not file separate applications to construct, launch and operate technically identical replacement satellites within the term of the system authorization. However, the licensee shall certify to the Commission, at least thirty days prior to launch of such replacement(s) that:

(1) the licensee intends to launch a space station that is technically identical to those authorized in its system authorization, and

(2) launch of this space station will not cause the licensee to exceed the total number of operating space stations authorized by the Commission.

~~(d)~~ (e) In-Orbit Spares. Licensees need not file separate applications to operate technically identical in-orbit spares authorized as part of the blanket license pursuant to paragraph (a) of this section. However, the licensee shall certify to the Commission, within 10 days of bringing the in-orbit spare into operation, that operation of this space station did not cause the licensee to exceed the total number of operating space stations authorized by the Commission.

(f) Implementation Milestones.

(1) Each 1.6/2.4 GHz mobile-satellite system license shall specify milestone dates requiring the licensee to:

(i) commence construction of its first two satellites within one year of grant, and complete construction of these satellites within four years of grant;

(ii) commence construction of all satellites necessary to commence commercial service within three years of grant; and

(iii) complete launch and commence operation of its entire system within six years of grant.

(2) All operators of 1.6/2.4 GHz mobile-satellite systems shall, within 10 days after a required implementation milestone as specified in the system authorization, certify to the Commission by affidavit that the milestone has been met or notify the Commission by letter that it has not been met. Commencement of construction of a satellite may be certified based upon finalization of a construction plan (where the licensee will construct its own satellites) or the entry into a non-contingent contract with a third-party for satellite construction. At its discretion, the Commission may require the submission of additional information (supported by affidavit of a person or persons with knowledge thereof) to demonstrate that a milestone has been met.

(3) The Commission shall entertain requests for extensions of milestone deadlines for 1.6/2.4 GHz mobile-satellite systems at any time after the commencement of the subject system's license term. A licensee requesting such an extension must make a full showing, supported by an affidavit, explaining the justification for the extension.

and certifying that it remains committed to establishing the full constellation it is authorized to construct.

(4) In the event that a milestone deadline is missed, the Commission shall order the licensee or permittee to show cause why its authorization should not be revoked. Such order shall be publicly issued within ten days after a licensee or permittee files a report pursuant to § 25.143(f)(2) indicating that a milestone has not been met, or within twenty days after a milestone date has passed without the licensee or permittee submitting its required certification. Following the adoption of the show cause order, the subject licensee or permittee shall have fifteen days to submit its response, and any interested parties shall be permitted fifteen days within which to comment upon the response. Any replies shall be due within five days of the comment filing deadline. Within thirty days after the reply deadline, the Common Carrier Bureau shall issue a decision based upon these submissions, which shall be subject to review by the Commission in accordance with § 1.115; provided that the Commission must render a decision on such application within sixty days of the conclusion of the pleading cycle specified in § 1.115.

~~(e)~~ (g) Reporting Requirements.

(1) Consistent with § 25.120(d)(2) of this subpart, each system licensee shall certify to the Commission the date upon which its first satellite is launched, and shall subsequently certify to the Commission the date when this satellite begins service transmissions.

~~(1)~~(2) All operators of 1.6/2.4 GHz mobile-satellite systems shall, on June 30 of each year, file with the Common Carrier Bureau and the Field Office in Laurel, Maryland a report, which shall be treated as not routinely available for public inspection under Section 0.457, et seq., containing the following information:

(i) Status of satellite construction and anticipated launch dates, including any major problems or delays encountered;

(ii) A listing of any non-scheduled space station ~~outages~~ outage that interrupted service for more than 30 minutes, and the cause(s) ~~or causes~~ of the outage, if known;

(iii) A detailed description of the ~~utilization made of the in-orbit satellite system. That description~~

~~should identify the percentage of time that the system is actually used for~~ **status of the system that identifies all instances where the system capacity is saturated during** U.S. domestic or transborder ~~transmission, the amount of capacity (if any) sold but not in service within U.S. geographic areas, and the amount of unused system capacity~~ **service, including the dates and duration of such saturation**; and

(iv) Identification of any space stations **that exhibit performance trends that could lead to the need to deploy a replacement satellite and an estimate of when such replacement is expected to be needed.** ~~not available for service or otherwise not performing to specifications, the cause or causes of these difficulties, and the date any space station was taken out of service or the malfunction identified.~~

~~(2) All operators of 1.6/2.4 GHz mobile satellite systems shall, within 10 days after a required implementation milestone as specified in the system authorization, certify to the Commission by affidavit that the milestone has been met or notify the Commission by letter that it has not been met. At its discretion, the Commission may require the submission of additional information (supported by affidavit of a person or persons with knowledge thereof) to demonstrate that the milestone has been met.~~ **[Modified and moved to Implementation Milestones, § 25.143(f)(2).]**

~~(g)~~ **(h)** Safety and distress communications. Stations operating in the 1.6/2.4 GHz Mobile-Satellite Service that are used to comply with any statutory or regulatory equipment carriage requirements may also be subject to the provisions of Sections 321(b) and 359 of the Communications Act of 1934, as amended. Licensees are advised that these provisions give priority to radio communications or signals relating to ships in distress and prohibits a charge for the transmission of maritime distress calls and related traffic.

~~(h)~~ **(i)** Considerations involving transfer or assignment applications.

(1) "Trafficking" in licenses issued pursuant to paragraph (a) of this section is prohibited.

(2) The Commission will review a proposed transaction to determine if the circumstances indicate trafficking in licenses whenever applications (except those involving pro forma assignment or transfer of control) for consent to assignment or a license, or for transfer of control of a

licensee, involve facilities licensed pursuant to paragraph (a) of this section. At its discretion, the Commission may require the submission of an affirmative, factual showing (supported by affidavits of a person or persons with personal knowledge thereof) to demonstrate that no trafficking has occurred.

(3) If a proposed transfer of radio facilities is incidental to a sale of other facilities or merger of interests, any showing requested under paragraph (g)(2) of this section shall include an additional exhibit which:

(i) Discloses complete details as to the sale of facilities or merger of interests;

(ii) Segregates clearly by an itemized accounting, the amount of consideration involved in the sale of facilities or merger of interests; and

(iii) Demonstrates that the amount of consideration assignable to the facilities or business interests involved represents their fair market value at the time of the transaction.

§ 25.201 DEFINITIONS.

Mobile Satellite Service. A radiocommunications service: (1) Between mobile earth stations and one or more space stations, or between space stations used by this service; or (2) Between mobile earth stations by means of one or more space stations. This service may also include feeder links necessary for its operation. (RR)

* * *

1.6/2.4 GHz Mobile-Satellite Service: A mobile-satellite service that operates in the 1610-1626.5 MHz and 2483.5-2500 MHz frequency bands, or in any portion thereof.

§ 25.202 FREQUENCIES, FREQUENCY TOLERANCE AND EMISSION LIMITATIONS.

(a) * * *

(4) The following frequencies are available for use by the 1.6/2.4 GHz Mobile-Satellite Service:

1610-1626.5 MHz: User-to-Satellite Link **(primary)**
~~1613.8~~ **1621.35**-1626.5 MHz: Satellite-to-User Link (secondary)
2483.5-2500 MHz: Satellite-to-User Link **(primary)**

(5) The following frequencies are available for use by the inter-satellite service:

22.55-23.00 GHz
23.00-23.55 GHz
24.45-24.65 GHz
24.65-24.75 GHz

§ 25.203 CHOICE OF SITES AND FREQUENCIES.

(c) * * *

(2)(vii) Antenna horizon gain plot(s) determined in accordance with § 25.253(b) for satellite longitude range specified in paragraph (c)(2)(v) of this section, taking into account the provisions of § 25.253(a)(2) for earth stations operating with non-geostationary satellites.

* * *

(j) Applicants for non-geostationary 1.6/2.4 GHz Mobile-Satellite Service / radiodetermination satellite service feeder links outside the bands specified in § 25.202(a)(5) shall indicate the frequencies and spacecraft antenna gain contours towards each feeder-link earth station location and will coordinate with licensees of other fixed-satellite service and terrestrial-service systems sharing the band to determine geographic protection areas around each non-geostationary mobile-satellite service / radiodetermination satellite service feeder link earth station.

(k) An applicant for **an** ~~a non-geostationary space station or~~ earth station that will operate with a geostationary satellite or non-geostationary satellite in a ~~shared~~ frequency band in which the non-geostationary system is (or is proposed to be) licensed for feeder links, shall demonstrate in its application that its proposed ~~space or~~ earth station will not cause unacceptable interference to any other satellite network that is **operating** ~~authorized to operate~~ in the same frequency band, or certify that the operations of its ~~space or~~ earth station shall conform to established coordination agreements between the operator(s) of the space station(s) with which the earth station is to communicate and the operator(s) of any other space station licensed to use the band.

§ 25.208 POWER FLUX DENSITY LIMITS.

(c) In the 17.7-19.7 GHz, 22.55-23.00 GHz, 23.00-23.55 GHz, and 24.45-24.75 GHz frequency bands, the power flux density at the Earth's surface produced by emissions from a space station for

all conditions and for all methods of modulation shall not exceed the following values:

-115 dB (W/m^2) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane.

-115 + 0.5 (d-5) dB (W/m^2) in any 1 MHz band for angles of arrival d (in degrees) between 5 and 25 degrees above the horizontal plane.

-105 dB (W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

§ 25.213 INTER-SERVICE ~~COORDINATION REQUIREMENTS~~ SHARING CRITERIA FOR THE 1.6/2.4 GHz MOBILE-SATELLITE SERVICE

(a) Protection of the radio astronomy service against interference from mobile-satellite service systems in the 1610.6-1613.8 MHz band.

(1) Protection zones. All 1.6/2.4 GHz Mobile-Satellite Service systems, ~~except for those employing beacon-actuated protection zones pursuant to § 25.213(a)(2),~~ shall be capable of determining the position of the user transceivers accessing the space segment through either internal radiodetermination calculations or external sources such as LORAN-C or the Global Positioning System. During periods of radio astronomy observations, land mobile earth stations shall not operate in the 1610.6-1613.8 MHz frequency band when located within the geographic protection zones defined by the radio observatory coordinates and separation distances as follows:

(i) Within a 160 km radius of the following radio astronomy sites:

[TABLE OMITTED]

(ii) Within a 50 km radius of the following sites:

[TABLE OMITTED]

(iii) For airborne earth stations operating in the 1610.6-1613.8 MHz frequency band, the separation distance shall be the larger of the distance specified in subparagraph (1) or (2) of this paragraph, as appropriate, or the distance, d, as given by the formula:

d (km) = 4.1 square root of (h)

where h is the altitude of the aircraft in meters above ground level.

(iv) A smaller geographic protection zone may be used in lieu of the areas specified in subparagraphs (i), (ii), and (iii) of this paragraph if agreed by the mobile-satellite service licensee and the Electromagnetic Spectrum Management Unit (ESMU), National Science Foundation, Washington, D.C. upon a showing by the mobile-satellite service licensee that the operation of a mobile earth station will not cause harmful interference to a radio astronomy observatory during periods of observation.

(v) The ESMU shall notify mobile-satellite service space station licensees authorized to operate in the 1610.6-1613.8 MHz band of periods of radio astronomy observations. The mobile-satellite system shall be capable of terminating operations in this band within the first position fix of the mobile terminal prior to transmission or as soon as practicable after entering the protection zone.

~~(vii)~~ **(vi)** Additional radio astronomy sites, not located within 100 miles of the 100 most populous urbanized areas as defined by the United States Census Bureau at the time, may be afforded similar protection **if supported by the record in a rulemaking proceeding initiated pursuant to Part 1 Subpart C,** ~~one year after notice to the mobile satellite system licensee and the issuance of a public notice by the Commission.~~

~~(vi)~~ **(2)** A beacon-actuated protection zone may be used in lieu of fixed protection zones in the 1610.6-1613.8 MHz band if a coordination agreement is reached between a mobile-satellite system licensee and the EMSU on the specifics of beacon operations.

~~(2)~~ **(3)** Mobile-satellite service space stations transmitting in the 1613.8-1626.5 MHz band shall limit out-of-band emissions so as not to exceed -238 dB($W/m^2/Hz$) during observations at the facilities listed in paragraph (a)(1)(i) of this section and -198 dB($W/m^2/Hz$) during the observations at the facilities listed in paragraph (a)(1)(ii) of this section.

[(4) Mobile-satellite service mobile earth stations transmitting in the 1613.8-1626.5 MHz band shall limit out-of-band emissions so as not to exceed - 178 dB($W/m^2/1MHz$) during observations at the facilities listed in paragraph

(a)(1)(i) of this section and -138 dB(W/m^2/1MHz) during the observations at the facilities listed in paragraph (a)(1)(ii) of this section. -- Alternative proposal as discussed in text of TRW's Reply Comments at 71 n.105]

~~(3)~~ **(5)** Mobile-satellite service space stations operating in the 2483.5-2500 MHz frequency band shall limit spurious emission levels in the 4990-5000 MHz band so as not to exceed -241 dB (W/m^2/Hz) at the surface of the Earth.

(b) Protection of the radionavigation-satellite service operating in the 1559-1610 MHz band. Mobile earth stations operating in the 1610-1626.5 MHz band shall limit out-of-band emissions in the 1574.397-1576.443 MHz band **and the 1598 to 1606 MHz band** so as not to exceed an e.i.r.p. density level of ~~-70~~ **-50** dB (W/MHz) ~~average~~ **averaged** over any 20 ms period. ~~The e.i.r.p. of any discrete spurious emission (i.e., bandwidth less than 600 Hz) in the 1574.397-1576.443 MHz band shall not exceed -80 dBW.~~

(c) Protection of aeronautical radionavigation systems operating pursuant to International Radio Regulation RR 732.

(1) Mobile-satellite earth stations transmitting in the 1610-1626.5 MHz band shall limit e.i.r.p. levels to no greater than -15 dB (W/4kHz) on frequencies being used by systems operating in accordance with International Radio Regulation RR 732, and to no greater than -3 dB (W/4kHz) on frequencies that are not so being used. ~~Pursuant to RR 731E and RR 731F, all mobile satellite operations in the 1610-1626.5 MHz band (both Earth to space and space to Earth) must be coordinated with systems operating pursuant to RR 732. Such mobile satellite stations shall not cause harmful interference to, or claim protection from, stations in the aeronautical radionavigation service and stations operating pursuant to RR 732.~~

~~(2) Airborne 1.6/2.4 Mobile Satellite Service earth stations shall not operate on civil aircraft unless the earth station has a direct physical connection to the aircraft cabin communication system.~~ **[Redundant with § 25.136(a)].**

~~(3)~~ **(2)** Mobile-satellite space stations transmitting in the 1613.8-1626.5 MHz space-to-Earth band shall not exceed a power flux density level of -141.5 dBW/m^2 - 4 KHz in the 1613.8-1616 MHz band.

(d) Protection from fixed stations operating pursuant to International Radio Regulation RR 730. Pursuant to RR 731E, all mobile-satellite operations in the 1610-1626.5 MHz band (both Earth-to-space and space-to-Earth) must be coordinated with

systems operating pursuant to RR 730. All such mobile-satellite stations shall not cause harmful interference to, or claim protection from, stations in the fixed service operating pursuant to RR 730.

§ 25.278 ADDITIONAL COORDINATION OBLIGATION FOR NON-GEOSTATIONARY AND GEOSTATIONARY SATELLITE SYSTEMS IN FREQUENCIES ALLOCATED TO THE FIXED-SATELLITE SERVICE.

Licensees of non-geostationary satellite systems that use frequency bands allocated to the fixed-satellite service for their feeder link operations shall coordinate their operations with licensees of geostationary fixed-satellite service systems licensed by the Commission for operation in the same frequency bands. Licensees of geostationary fixed-satellite service systems in the frequency bands that are licensed to non-geostationary satellite systems for feeder link operations shall coordinate their operations with the licensees of such non-geostationary satellite systems.

§ 25.279 INTER-SATELLITE SERVICE.

(1) Any non-geostationary satellite communicating with other space stations may use frequencies in the inter-satellite service as indicated in § 2.106. This does not preclude the use of other frequencies for such purposes as provided for in several service definitions, e.g., FSS. The technical details of the proposed inter-satellite link shall be provided in accordance with § 25.114(c).

(2) Operating conditions. In order to ensure compatible operations with authorized users in the frequency bands to be utilized for operations in the inter-satellite service, these inter-satellite service systems must operate in accordance with the conditions specified in this section.

(a) Coordination requirements with federal government users.

(i) In frequency bands allocated for use by the inter-satellite service that are also authorized for use by agencies of the federal government, the federal use of frequencies in the inter-satellite service frequency bands is under the regulatory jurisdiction of the National Telecommunications and Information Administration (NTIA).

(ii) The Commission will use its existing procedures to reach agreement with NTIA to achieve compatible operations between federal government users

under the jurisdiction of NTIA and inter-satellite service systems through frequency assignment and coordination practice established by NTIA and the Interdepartment Radio Advisory Committee (IRAC). In order to facilitate such frequency assignment and coordination, applicants shall provide the Commission with sufficient information to evaluate electromagnetic compatibility with the federal government users of the spectrum, and any additional information requested by the Commission. As part of the coordination process, applicants shall show that they will not cause interference to authorized federal government users, based upon existing system information provided by the government. The frequency assignment and coordination of the satellite system shall be completed prior to grant of construction authorization.

(b) Coordination among inter-satellite service systems. Applicants for authority to establish inter-satellite service are encouraged to coordinate their proposed frequency usage with existing permittees and licensees in the inter-satellite service whose facilities could be affected by the new proposal in terms of frequency interference or restricted system capacity. All affected applicants, permittees, and licensees, shall at the direction of the Commission, cooperate fully and make every reasonable effort to resolve technical problems and conflicts that may inhibit effective and efficient use of the radio spectrum; however, the permittee or licensee being coordinated with is not obligated to suggest changes or re-engineer an applicant's proposal in cases involving conflicts.

AUTHORITY: Secs. 4, 303, 48 Stat., as amended, 1066, 1082; 47 U.S.C. 154, 303, unless otherwise noted.

§ 94.61 APPLICABILITY

(b)(4) Frequencies in this band are shared with mobile and radiolocation stations in other services, and must accept harmful interference that may be experienced from operations of industrial, scientific, or medical (ISM) equipment operating on 2450 MHz. In the 2483.5-2500 MHz band, no applications for new stations or modifications to existing stations to increase the number of transmitters will be accepted. Existing licensees as of July 25, 1985, are grandfathered and their operation is co-primary with the Radiodetermination Satellite Service and Mobile-Satellite Service. However, all grandfathered temporary fixed licensees are required to notify directly such Radiodetermination

Satellite Service and Mobile-Satellite Service licensees concerning present and proposed locations of operations.

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In addition to the foregoing changes to the Commission's proposed rules in CC Docket No. 92-166, TRW concurs with LQP's proposal of the following change to Part 20 of the Commission's Rules:

§ 20.9 COMMERCIAL MOBILE RADIO SERVICE.

(a) * * *

(10) Any mobile satellite service ~~involving~~ **offering** the provision of commercial mobile radio service ~~(by licensees or resellers)~~ directly to end users, except that mobile satellite licensees ~~and other entities that sell or lease space segment capacity, to the extent that it does not provide commercial mobile service directly to end users,~~ may provide space segment capacity to ~~commercial mobile radio service providers~~ **other parties** on a non-common carrier basis~~, if so authorized by the Commission~~.